3GPP TSG RAN Meeting #70
Sitges, Spain, Dec. 7 - 10, 2015

RP-152272

Source:	**Ericsson, Huawei**
Title:	**New Work Item on enhanced LAA for LTE**
Document for:	**Approval**
Agenda Item:	**14.1.1**

3GPP™ Work Item Description

For guidance, see 3GPP Working Procedures, article 39; and 3GPP TR 21.900.
Comprehensive instructions can be found at http://www.3gpp.org/Work-Items

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Title: **New Work Item on enhanced LAA for LTE**

Acronym: eLAA_LTE

Unique identifier:

NOTE: If this is a RAN WID including Core and Perf. part, then Title, Acronym and Unique identifier refer to the feature WI. Please tick (X) the applicable box(es) in the table below:

This WID includes a Core part	X
This WID includes a Performance part	X

1 3GPP Work Area

X	**Radio Access**
	Core Network
	Services

2 Classification of WI and linked work items

2.0 Primary classification

This work item is a …

	Study Item (go to 2.1)
X	**Feature (go to 2.2)**
	Building Block (go to 2.3)
	Work Task (go to 2.4)

NOTE: Core, Performance and Testing parts of RAN WIs are usually Building Blocks.
If you are in doubt, please contact MCC.

2.1 Study Item

Related Work Item(s) (if any]		
Unique ID	**Title**	**Nature of relationship**

Go to §3.

2.2 Feature

Related Study Item or Feature (if any)		
Unique ID	**Title**	**Nature of relationship**
650016	Study on Licensed-Assisted Access to Unlicensed Spectrum	Corresponding SI
680160	Work Item on Licensed-Assisted Access to Unlicensed Spectrum	The result of the work item gives the basis of the work

Go to §3.

2.3 Building Block

Parent Feature (or Study Item)		
Unique ID	**Title**	**TS**

This work item is …

	Stage 1 (go to 2.3.1)
	Stage 2 (go to 2.3.2)
	Stage 3 (go to 2.3.3)
	Test spec (go to 2.3.4)
	Other (go to 2.3.5)

2.3.1 Stage 1

Source of external requirements (if any)		
Organization	**Document**	**Remarks**

Go to §3.

2.3.2 Stage 2

Corresponding stage 1 work item		
Unique ID	**Title**	**TS**

Other source of stage 1 information		
TS or CR(s)	**Clause**	**Remarks**

If no identified source of stage 1 information, justify:

Go to §3.

2.3.3 Stage 3

Corresponding stage 2 work item (if any)		
Unique ID	**Title**	**TS**

Else, corresponding stage 1 work item		
Unique ID	**Title**	**TS**

Other justification		
TS or CR(s) or external document	**Clause**	**Remarks**

If no identified source of stage 2 information, justify:

Go to §3.

2.3.4 Test spec

Related Work Item(s)		
Unique ID	**Title**	**TS**

Go to §3.

2.3.5 Other

Related Work Item(s)			
Unique ID	**Title**	**Nature of relationship**	**TS / TR**

Go to §3.

2.4 Work task

Parent Building Block		
Unique ID	**Title**	**TS**

3 Justification

The fast uptake of LTE in different regions of the world shows both that demand for wireless broadband data is increasing and that LTE is an extremely successful platform to meet that demand.

For IMT systems, existing and new spectrum licensed for exclusive use by IMT technologies will remain fundamentally critical for providing seamless coverage, achieving the highest spectral efficiency, and ensuring the highest reliability of cellular networks through careful planning and deployment of high-quality network equipment and devices. All these cannot be achieved by unlicensed spectrum which can never match the qualities of the licensed regime.

However, use of unlicensed spectrum is increasingly considered by cellular operators as a complementary tool to augment their service offering and solutions. Efficient use of unlicensed spectrum as a complement to licensed spectrum has the potential to bring great value to service providers, and, ultimately, to the wireless industry as a whole. Given the widespread deployment and usage of other technologies in unlicensed spectrum for wireless communications in our society, it is necessary that LTE has to coexist with existing and future uses of unlicensed spectrum.

Within Rel-13, 3GPP defined a DL only design for LTE to utilize the unlicensed spectrum. The Rel-13 work also investigated UL channel access mechanisms for unlicensed spectrum usage.

To leverage the full benefits of LTE operation in unlicensed spectrum, it is of outmost importance to define a complete UL access scheme in addition to the already defined DL access scheme.

[1] TR 36.889 Feasibility Study on Licensed-Assisted Access to Unlicensed Spectrum V13.0.0

4 Objective

4.1 Objective of SI or Core part WI or Testing part WI

The objective within this work item is to specify UL support for LAA SCell operation in unlicensed spectrum. Standalone operation within unlicensed spectrum is not included. The specification work shall be based on extending the LTE design and in particular the LAA design. The LAA design should allow fair coexistence between Wi-Fi and LAA and fair coexistence between different LAA systems. Coexistence measures should still allow efficient operation of all coexisting technologies. This shall be ensured by following the recommendations and conclusions from the TR on LAA and continuing to consider coexistence for the specification work [1].

The core technology should be as much as possible band agnostic. To allow for an efficient design, the enhancements should reuse the features of LTE as much as possible. Forward compatibility should be taken into account so that support for dual connectivity can be specified without significant changes to the design. Duplication of work done in other LTE work items should be avoided.

The detailed objectives of the work item are to specify support for the following functionalities:

- UL carrier aggregation for LAA SCell(s) (with one or more UL carriers in unlicensed band) using Frame Structure type 3 [RAN1, RAN2, RAN4]
    - The channel access mechanism shall use the decisions made in RAN1 during Rel-13 as a starting point
    - Specify support for PUSCH and SRS
    - Support both self-scheduling and cross-carrier scheduling from licensed spectrum.
    - If needed, specify support for PUCCH [RAN1]
    - If needed, specify support for PRACH [RAN1]
- The work item should also specify base station and UE core requirements of 5 GHz spectrum to support the above features [RAN4]
- Complete support for 10 MHz system bandwidth as an LAA SCell [RAN4, RAN1]

4.2 Objective of Performance part WI

NOTE: Leave empty if the WI proposal does not contain a RAN performance part.

Specify the necessary UE and base station performance requirements to support UL carrier aggregation for an LAA SCell using Frame Structure type 3.

4.3 RAN time budget proposal

NOTE: For WIs/SIs under RAN WG5 leadership this section is not filled out. Otherwise: For a not yet approved WI/SI the rapporteur has to fill out the last row of the table(s) below up to the target date of the WI/SI (if necessary add further tables): Indicate the number of time units (1 TU ~ 2h), i.e. one value for each session/field. If no time unit is needed, leave the field empty.
For WI/SI already approved in the past, the tables below will no longer be updated in the WI/SI description (i.e. the tables reflect the status of the initial approval). But changes can be proposed in the status report of the WI/SI.

RAN #70 #71					**Q1/2016**				**RAN**
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf
84	84	93	93	89	91	78	78	78	78
4									

RAN #71 #72									**Q2/2016**									**RAN**	
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf	R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf
84bis	84bis	93bis	93bis	89bis	91bis	78bis	78bis	78bis	78bis	85	85	94	94	90	92	79	79	79	79
4		**2**				**1.5**	**1.5**			**4**		**2**				**1.5**	**1.5**		

RAN #72 #73					**Q3/2016**				**RAN**
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf
86	86	95	95	91	93	80	80	80	80
		2				**1.5**	**1.5**		

RAN #73 #74									**Q4/2016**									**RAN**	
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf	R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf
86bis	86bis	95bis	95bis	91bis	93bis	80bis	80bis	80bis	80bis	87	87	96	96	92	94	81	81	81	81
								1	**1**									**1**	**1**

RAN #74 #75					**Q1/2017**				**RAN**
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf
88	88	97	97	89	95	82	82	82	82
								1	**1**

RAN #75 #76									**Q2/2017**									**RAN**	
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf	R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf
88bis	88bis	97bis	97bis	97bis	95bis	82bis	82bis	82bis	82bis	89	89	98	98	98	96	83	83	83	83

RAN #76 #77					**Q3/2017**				**RAN**
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf

90	90	99	99	99	97	84	84	84	84

L: LTE, U: UMTS, J: Joint, RD: RRM/demodulation

NOTE: In case further explanation of the time budget proposal is needed, then please explain this below.

additional comments to the time budget proposal:

5 Service Aspects

6 MMI-Aspects

7 Charging Aspects

8 Security Aspects

9 Impacts

Affects:	**UICC apps**	**ME**	**AN**	**CN**	**Others**
Yes		X	X		
No	X			X	X
Don't know					

10 Expected Output and Time scale

New specifications [If Study Item, one TR is anticipated]						
Spec No.	Title	1st rsp. WG	2nd rsp. WG(s)	Presented for information at plenary#	Approved at plenary #	Comments

NOTE: If this is a RAN WID including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Comments for each spec.
By default a new specs can only be new for one of both parts.

Affected existing specifications [None in the case of Study Items]				
Spec No.	CR	Subject of the CR	Approved at plenary#	Comments
36.211		Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation	RAN#72	Core Part
36.212		Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding	RAN#72	Core Part
36.213		Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures	RAN#72	Core Part
36.214		Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer; Measurements	RAN#72	Core Part
36.300		Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2	RAN#73	Core Part
36.306		Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio access capabilities	RAN#73	Core Part
36.321		Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification	RAN#73	Core Part
36.331		Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification	RAN#73	Core Part
36.101		Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception	RAN#73	Core Part
36.133		Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management	RAN#73	Core Part
36.104		Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception	RAN#73	Core Part
36.141		Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing	RAN#73	Core Part
36.101		Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception	RAN#75	Performance Part
36.133		Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management	RAN#75	Performance Part

36.104		Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception	RAN#75	Performance Part
36.141		Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing	RAN#75	Performance Part

NOTE: If this is a RAN WID including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Comments for each spec.
If an existing spec is affected by both (Core part and Perf. part), then it has to be listed twice with appropriate approval dates.

11 Work item rapporteur(s)

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12 Work item leadership

RAN WG1

NOTE: If this is a RAN WID including Core and Perf. part, then this WG specifies the WG leading the Core part.
RAN WG4 is by default leading the Perf. part.

13 Supporting Individual Members

Supporting IM name
Ericsson
Huawei
HiSilicon
Alcatel-Lucent
Alcatel-Lucent Shanghai Bell
Telstra
Sequans Communications
Institute for Information Industry
TCL Communications
WILUS Inc
SK Telecom
Nokia Networks
Sharp
Softbank
NEC
Verizon
Interdigital
Dish Network
Qualcomm Inc.
KDDI
OPPO
Lenovo
Motorola Mobility
Panasonic
NTT DOCOMO
CATT
ITRI
ZTE
CATR
TeliaSonera
CMCC
Deutsche Telekom
Vodafone
Intel Corporation
AT&T
LG Electronics
Samsung